

ORIGINAL RESEARCH

Understanding implementation of maternal acute illness management education by measuring capability, opportunity and motivation: A mixed methods study in a low-income country

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ABSTRACT

A major cause of maternal death in low-income countries is a lack of adequate healthcare. The dominant approach to improving care involves continuing professional development but little is known about their impact on practice. Less still is known about the determinants of practice change and barriers to implementation. This study investigated the implementation of an acute illness management course on Ugandan health professionals' practice and determinants of practice change. Before and after training, 51 nurses, midwives, doctors and clinical officers completed tests of knowledge. Immediately post-course and 1-month later, participants completed questions assessing intention to change practice, practice and determinants of change. Post course, participants took part in focus groups. Post-course, participants reported that they were capable and were motivated to use their knowledge and skills in practice and a lower belief in opportunity to change practice. Behavioural intention was very high and behaviour 1 month later was statistically significantly lower. Three themes emerged: 1) systematic approach changing clinical practice, 2) inter-professional communication, and 3) barriers and facilitators to implementation. Educators should consider behaviour change determinants as important assessments of outcome because they provide crucial implementation of training into practice.

Key Words: Health professional education, Workforce, Acute care, Behaviour change, Implementation

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1. BACKGROUND

Worldwide, the majority of maternal deaths occur in low- and middle-income countries (LMIC),^[1] in part, due to the poor training clinical staff receive in managing acute maternal illness.^[2–6] The frequency of maternal acute and critical illness in LMICs and the need for training in early recognition, assessment and management of these patients means there has been an increase in the popularity of acute and critical illness courses delivered in LMIC. AIM[©] and M-AIM[©] are one-day practical courses, teaching recognition, assessment and management of acutely patients and obstetric patients, respectively.^[7–9] We have previously found that these courses are acceptable, feasible and increase the knowledge of doctors, nurses and clinical officers in Uganda.^[10,11] However, there is no evidence of the impact that these courses, or those like them, have on the professional practice of the attendees.

Professional practice can be conceptualised as sets of behaviours undertaken by healthcare professionals. In our experience, although “behavior” is often used in healthcare education to mean “professionalism”, here we are conceptualising it as those practices that healthcare professionals perform as part of their clinical duties. Theories of behaviour change, therefore, can be useful in designing and evaluating educational interventions that seek to change professional practice^[12] and, indeed, this approach is often taken by implementation scientists.^[13–17] The COM-B model represents a simple, accessible behaviour change framework.^[18] It proposes that behaviours are determined by a person’s capability (C), opportunity (O) and motivation (M). The COM-B is at the centre of the Behaviour Change Wheel, which proposes that behaviour change is achieved via several intervention functions (including education, training, persuasion, enablement and environmental restructuring) and by various policy initiatives (including guidelines, fiscal measures, communication and marketing). Frameworks like COM-B are important because behaviour can be changed more effectively if interventions are based on evidence-based principles of behaviour change.^[19] Additionally, assessing the steps in the theoretical pathway from an educational input to professional practice enables us to conclude not just whether education changes professional practice but also how. Crucially, if education does not change professional practice we can create evidence-based theories as to why and what can be altered to increase effectiveness. Course evaluations typically do not include measurement of change in practice.^[20]

In this study, we explored how knowledge and skills acquired on a M-AIM[©] course are implemented in practice. This study aimed to 1) measure the capability, opportunity and motivation of a group of healthcare professionals to change their professional practice after participating in M-AIM[©],

2) investigate whether capability, opportunity and motivation were altered from immediately post-course to 1-month later, 3) explore the relationships between capability, opportunity, motivation and behavioural intention immediately post course and self-reported behaviour 1-month later, and 4) explore the healthcare professionals’ perceptions of their intentions, barriers and facilitators to implement the acute illness management skills and knowledge.

2. METHODS

This was a mixed methods study with 3 data collection points: pre-course, post-course and 1-month follow up.

2.1 Participants

Participants were doctors, nurses, midwives and clinical officers from two hospitals in Northern Uganda. They were invited by their clinical leadership team to take part in a one-day course on maternal acute illness management. All participants were invited to take part in the questionnaires and take part in the focus groups.

2.2 Intervention

M-AIM[©] is a one-day course teaching the recognition, assessment and initial management of acute illness in obstetric women. The day begins with a pre-course MCQ that assessed knowledge. There are then lectures, followed by small group hands-on workshops around the themes of shortness of breath, cardiovascular problems, oliguria and altered levels of consciousness. There are demonstrations, by faculty, of the correct “ABCDE” approach and four practice scenarios in which participants practice the ABCDE approach in cases linked to the earlier workshops. The course day finishes with a post-course MCQ test of knowledge and a one-to-one oral assessment.

2.3 Procedure

Potential participants *i.e.*, those taking part in the M-AIM[©] training, were given an information sheet about the research as they arrived and registered for the course. They had up to one hour to read the information and researchers were on hand to answer any questions. During the course introduction, a researcher (JH) provided a verbal explanation of the information sheet contents and answered questions. Consent forms were distributed and participants were asked to consent if they wished to participate in the research. Information sheet, consent form and verbal instructions all assured participants that they could take part in the course without participating in the research.

At time 1 (pre-course), participants completed a 25-item multiple choice question (MCQ) test of their knowledge of acute illness management. At time 2 (immediately post-course)

participants completed a different 25-item MCQ test of their knowledge, as is standard on all AIM[©] courses. In addition, at time 2 participants completed a questionnaire about their capability, opportunity and motivation to change their practice in relation to acute illness management and a brief (15 minutes) focus group. At time 3 (1-month post-course) the time 2 questionnaire was repeated with additional questions about participants' behaviour relating to maternal acute illness management. Questionnaires at time 3 were distributed and collected by a researcher (JT) who either gave questionnaires directly to participants or distributed them through their clinical managers. The study was granted ethical approval from the local hospital Research Ethics Committee and the Ugandan National Research Ethics Committee.

2.4 Materials

The questionnaire included a total of 79 questions (see Table 1) that assessed capability, opportunity, motivation, behavioural intention and behaviour (see Table 2).

Capability was assessed in three ways:

- (1) Knowledge was assessed by multiple-choice questions. These questions were developed by the GMCCSI (<http://www.gmcriticalcareskillsinstitute.org.uk>) and are routinely used with M-AIM[©] delivered worldwide (scores range from a minimum of 0 to a maximum 25).
- (2) Self-reported capability was assessed by checklist of 35 items containing a list of capabilities included in the M-AIM[©] course. Participants were asked to indicate whether they could perform the tasks totally independently (score of 2), with some help (score of 1) or not at all (score of 0). Scores ranged from a minimum of 0 to a maximum of 70.

Overall capability was assessed with four questions which asked the participants to indicate the extent to which they agreed with statements about their capability of using the M-AIM[©] approach (from strongly disagree to strongly agree). Median scores ranged from a minimum of 1 to a maximum of 4. A lower score indicated a lower report of capability.

Opportunity was a single item where participants were asked to indicate whether lack of equipment had or would interfere with implementation. This was included because previous course evaluation and experience indicated that lack of equipment removed opportunity for implementation. A lower score indicated a lower report of opportunity.

Motivation questions (5 questions) were based on the theory of planned behaviour, a model of human behaviour that has been successful in predicting a range of health behaviours,^[21]

using the REBEQI manual^[22] and included measures of subjective norms (2 questions) and outcome expectancies (3 items). Perceived behavioural control was not measured as part of motivation but rather was included in the concept of capability. Median scores ranged from a minimum of 1 to a maximum of 4. A lower score indicated a lower report of motivation.

Behavioural intention was assessed by asking "Estimate how many patients you see in a typical working week (number a). Estimate how many of these would be suitable for a systematic approach to assess or manage acute illness (number b). Of these, how many do you intend to use the systematic approach taught on the maternal AIM course with? (number c)". Behavioural intention score was $(c/b) \times 100$. Scores ranged from a minimum of 0 to a maximum of 100%. A lower score indicated a lower report of behavioural intention.

Behaviour was calculated by asking participants to completed the stem: "I estimate that I see (number a) people in my working week. Of these (number b) are suitable for a systematic approach to the assessment and management of acute illness. Of these suitable patients I have used a systematic approach (taught in the maternal AIM course) on (number c)". This was scored as per behavioural intention.

Perceptions of implementation were explored by asking participants (in focus groups). Questions were chosen to encourage the participants to imagine themselves in their workplace and bring to mind barriers to successfully implementing the learning from M-AIM[©]. Further, we explored participants' beliefs in the efficacy of the learning of M-AIM[©] in terms of its impact on patient care.

- (1) Think about leaving here today and then going to do your normal job. Can you see yourself doing different things? What differences might there be in what you do?
- (2) Can you describe how the approach taught in maternal AIM is different to what you have been taught/done before?
- (3) What sort of difficulties can you foresee in using your new knowledge and skills in your work?
- (4) If you were able to use your new skills and knowledge fully what would you expect to be the impact on your patients?
- (5) What would be the barriers to you using your new skills and knowledge?
- (6) What would encourage you to use your new skills and knowledge?
- (7) Have you got any comments about the course? About what you learnt?

Table 1. Questions for Time 2 and Time 3

	Yes	No		
All the equipment I need to perform a respiratory assessment is available to me when I am working				
All the equipment I need to manage a patient with breathing problems is available to me when I am working				
All the equipment I need to perform a manual pulse, blood pressure measurement, capillary refill time and temperature are available to me when I am working				
Estimate how many patients you see in a typical working week				
Estimate how many of these patients would be suitable for a systematic approach to assess or manage acute illness				
Of the patients suitable for a systematic approach, with how many do you intend to use the approach taught in the maternal AIM course?				
	Totally independently	With some help	Not at all	Don't know
I could assess whether an airway is patent or not				
I could confidently identify abnormal sounds in a patient's airway				
I could confidently identify if a patient has a see saw movement of their chest and abdomen				
I could perform a simple airway manoeuvre to open an airway				
I could use suction to remove secretions from an airway				
I could apply oxygen via a high concentration mask				
I could call for help from someone who could assist me with an airway problem				
I could measure a respiratory rate				
I could observe if a patient's chest was moving symmetrically				
I could identify a patient who is moving their accessory muscles				
I could identify cyanosis				
I could measure oxygen saturations				
I could position a patient to enable them to breathe more easily				
I could perform a manual pulse, blood pressure measurement, capillary refill time and temperature				
I could monitor urine output				
I could position the patient to relieve aorto-caval compression				
I could cannulate a patient				
I could take blood cultures/blood samples				
I could administer fluid bolus, titrating to effect				
I could catheterise a patient				
I could call for help from someone who could assist me with circulatory problems				
I could assess the conscious level of a patient using AVPU				
I could measure the patient's blood glucose level				
I could measure a patient's pupil size and reaction				
I could observe a patient for seizures				
I could perform a pain assessment on a patient				
I could place an unconscious patient in the recovery position				
I could administer glucose to a patient who is hypoglycaemic				
I could administer anti-epileptic medication to a patient who is having seizures				
I could administer analgesia to a patient who is in pain				
I could call for help from someone who could assist me with disability (neurological) problem				
I could perform a head to toe examination of a patient, front and back				
I could review charts, notes and investigations				
I could document my findings on charts/in notes				
I could ask for expert senior help at any point in my assessment				
I could communicate my findings to the team looking after the patient				
I could go back and review a patient's progress				
	Strongly disagree	Disagree	Agree	Strongly agree
I don't have the skills and knowledge to use a systematic approach to the assessment and management of the obstetric woman				
I am capable of using a systematic approach to the assessment and management of the obstetric woman				
I think that my approach to the acutely ill patient is improved since taking the maternal AIM course				
I would like to use the systematic approach taught in the maternal AIM course by I don't have the time				
I would like to use the systematic approach taught in the maternal AIM course by I don't have the equipment				
I think I am capable of using the approach taught in the maternal AIM course				
I think that if I use the approach taught in the maternal AIM course my patients will have a better clinical outcome				
I think that using the approach taught in the maternal AIM course will not improve patient outcomes				
There is no point using a systematic approach to the assessment and management of obstetric women because it doesn't improve patient outcomes				
I see people I work with using a systematic approach to the assessment and management of obstetric women				
People I work with would approve of me using the approach taught in the maternal AIM course				
**I estimate that I see	*	Patients in my working week		
**Of these	*	Are suitable for a systematic approach to assessment/management of acute illness		
**Of these suitable patients I have used a systematic approach on	*			

*Numbers were inserted here; **Time 3 only.

Table 2. Participant characteristics

		N (%)	Mean (sd)
Profession	Doctor	10 (20%)	
	Nurse	26 (51%)	
	Midwife	4 (8%)	
	Nurse & midwife	3 (6%)	
	Clinical officer	6 (12%)	
	Other	2 (4%)	
Type of hospital	Mission hospital	35 (67%)	
	Regional referral hospital	16 (31%)	
Months of practice			65 (64)

2.5 Analyses

Quantitative data were entered into SPSS (Statistical Package for the Social Sciences) V20. We calculated median overall capability, opportunity, and motivation scores. We described levels of capability, opportunity, motivation, behavioural intention and behaviour. We calculated Cronbach's alpha (and alpha with each item deleted in turn) to analyse the internal reliability of our measures of capability, opportunity and motivation. The data were non-parametric and so we used median and interquartile ranges as indicators of central tendency. We looked at change over time in levels of knowledge, capability, opportunity and motivation using Wilcoxon Rank Sum test and we conducted Spearman's Rank correlations to test whether capability, opportunity and motivation predicted behavioural intention and/or behaviour both post-course and 1-month later, and whether behavioural intention predicted behaviour. We used Bonferroni's correction for multiple comparisons such that the acceptable statistical significance was reduced from $p < .05$ to $p < .0001$ and we have reported where $p < .05$ or $p < .0001$.

Qualitative data: Focus groups were audio recorded and transcribed by a third party company (<http://www.sterlingtranscription.co.uk>). A thematic analysis using a method of constant comparisons was conducted.^[23] First, repeated topics were coded and generated themes to describe groups of topics. Two authors (JH and LBD) worked forwards and backwards through the transcripts looking for breadth of topics within each theme and, in particular, for statements that contradicted each other. Thematic analyses were conducted by the same two authors, discussed throughout and reviewed in light of discussions. The two authors who analysed the data were not involved in design or delivery or any of the training, and analysis was carried out independently of the training team.

3. RESULTS

3.1 Participants

Fifty-one participants, from a range of health professions, attended training, and all took part in some or all of the

research. There was a very large range of time since qualification with a mean months of practice of 65 (5 years 5 months) and a standard deviation of 64 months (5 years 4 months). For all participant characteristics see Table 2.

3.2 Questionnaire completion

Participants were only included in the analysis of each concept if they had completed all items within that concept. Behavioural intention and behaviour data from participants who gave responses that indicated lack of understanding of the questions (*i.e.*, a score of greater than 100%) were treated as missing data and were excluded pairwise from any comparisons. All candidates completed knowledge capability MCQ at time 1 (pre-course) and time 2 (post-course). Fewer candidates completed the questionnaires at time 2 (48) and fewer again at time 3 (39). Numbers of participants who completed all items for each concept are included in Table 3.

3.3 Internal consistency of measures

Cronbach's alphas for capability (overall and checklist) and motivation at time 2 (immediately post-course) ranged from a low 0.38 to an acceptable 0.75 and at time 3 (1-month follow-up) ranged from a low 0.42 to a low 0.47 (see Table 2). At time 2, the alpha for motivation would increase slightly but only to a low 0.49 with the removal of the item "I see people I work with using a systematic approach". The alpha for capability was much lower at time 3 (0.42) than at time 2 (0.75). At time 3, the alpha for capability increased to a moderate 0.54 with deletion of the item "I don't have the skills and knowledge to use a systematic approach".

3.4 Levels of COM, behavioural intention and behaviour

Levels of self-reported capability, motivation and behavioural intention were all very high at time 2 and time 3 (see Table 2). Levels of knowledge capability (at time 2), opportunity (time 2 and time 3) and behaviour (time 3) were not high. Participants self-reported high levels of capability on the checklist at time 2 (median of 94.29%) and at time 3 (median of 94.29%). The checklist items with lower reports of capa-

bility (< 85% reporting independent ability) were “calling for help, abnormal airway sounds, relieving compression, recovery position, pupil size and reaction, anti-epileptics”, and “reviewing charts” (see Figure 1). We measured capability in three ways: knowledge, checklist and overall but these three capability measures were not highly associated with each other. At time 2 (when these were all measured at the same time) knowledge and checklist capability correlated ($r_s = 0.402$, $p < .05$) but overall capability did not correlate with knowledge ($r_s = 0.235$, p is ns) or checklist capability ($r_s =$

0.180, p is ns). Overall capability and checklist capability, however, did correlate at time 3 ($r_s = 0.421$, $p < .05$) but these two correlations were not statistically significant. Twenty-eight of the 33 participants (84.8%) who gave valid answers to the behavioural intention question at time 2, stated that they intended to use the AIM approach with 100% of suitable patients. Thirteen of the 25 participants (52.0%) who gave valid answers to the behaviour question at time 3 stated that they had used the AIM approach with 100% of suitable patients.

Table 3. Medians, inter-quartile ranges, minimum, maximum and Cronbach’s alpha for COM, BI and B at times 1, 2 and 3

Concept	Time 1					Time 2					Time 3				
	N	Median (inter-quartile range)	Min	Max	Alpha	N	Median (inter-quartile range)	Min	Max	Alpha	N	Median (inter-quartile range)	Min	Max	Alpha
Overall capability	-	-	-	-	-	48	3.63 (0.75)	1.75	4	0.75	38	3.50 (0.75)	3	4	0.42
Checklist capability	-	-	-	-	-	33	94.29 (7.85)	64	100	-	29	94.29 (9.28)	66	100	-
Knowledge capability	51	48.0 (28.0)	8	88	-	51	64.0 (28.0)	32	96	-	-	-	-	-	-
Opportunity	-	-	-	-	-	48	2.0 (1.0)	1	4	-	39	2.0 (1.0)	1	4	-
Motivation	-	-	-	-	-	47	3.60 (0.4)	2.20	4	0.38	37	3.60 (0.4)	2.40	3.80	0.47
Behavioural intention	-	-	-	-	-	33	100.0 (0)	38	100	-	-	-	-	-	-
Behaviour	-	-	-	-	-	-	-	-	-	-	25	100.0 (52.8)	0	100	-

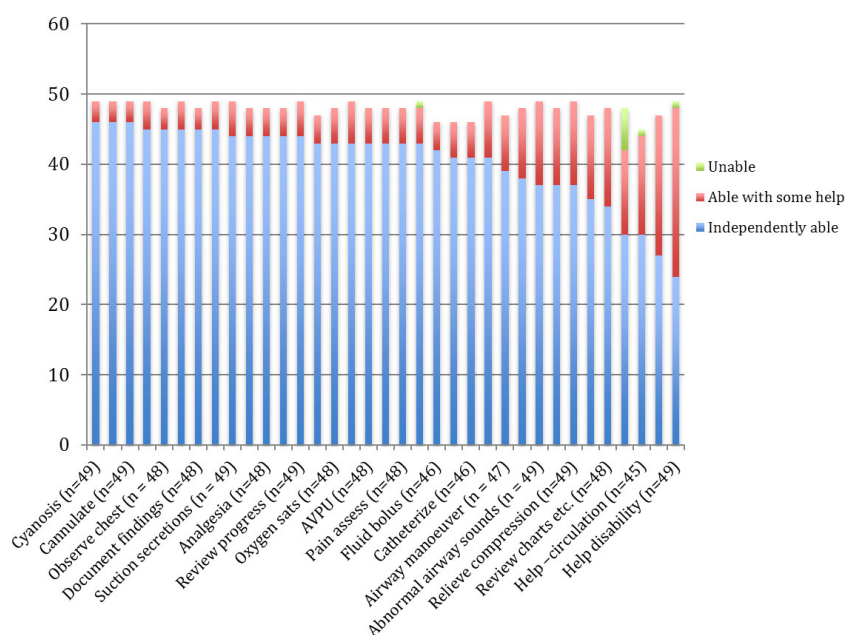


Figure 1. Checklist capability at time 2 (immediately post-course)

3.5 Associations and differences in COM over time

Capability (overall and checklist), opportunity and motivation at time 2 correlated moderately and statistically significantly with capability (overall and checklist), opportunity and motivation at time 3, respectively (see Table 4). Check-

list and overall capability, opportunity and motivation did not change from time 2 to time 3 (see Table 5). Knowledge capability changed significantly from time 1 to time 2 (see Table 5) and from time 1 to time 2 was statistically significantly and highly correlated (see Table 4).

Table 4. Spearman's rank correlations (r_s) between capability, opportunity, motivation, behavioural intention and behaviour at time 1, time 2 and time 3

		Knowledge capability T1	Knowledge capability T2	Overall capability T2	Opportunity T2	Motivation T2	Checklist capability T2	Overall capability T3	Opportunity T3	Motivation T3	Behavioural intention T2	Behaviour T3	Checklist capability T3
Knowledge capability T1	Correlation Coefficient	1	.713**	0.235	0.092	0.259	0.197	.390*	0.144	0.03	0.168	0.184	0.098
	Sig. (2-tailed)	.	0	0.107	0.532	0.078	0.273	0.016	0.382	0.861	0.335	0.369	0.613
	N	51	51	48	48	47	33	38	39	37	35	26	29
Knowledge capability T2	Correlation Coefficient	.713**	1	0.232	0.108	0.132	.402*	.391*	-0.025	0.08	0.073	-0.008	0.228
	Sig. (2-tailed)	0	.	0.113	0.467	0.375	0.021	0.015	0.879	0.636	0.678	0.971	0.234
	N	51	51	48	48	47	33	38	39	37	35	26	29
Overall Capability T2	Correlation Coefficient	0.235	0.232	1	-0.066	.452**	0.18	.592**	0.112	0.317	0.283	0.218	0.277
	Sig. (2-tailed)	0.107	0.113	.	0.661	0.001	0.315	0	0.504	0.06	0.105	0.294	0.146
	N	48	48	48	47	47	33	37	38	36	34	25	29
Opportunity T2	Correlation Coefficient	0.092	0.108	-0.066	1	0.12	-0.052	0.051	.613**	0	-0.198	0.086	0.027
	Sig. (2-tailed)	0.532	0.467	0.661	.	0.428	0.775	0.76	0	0.999	0.263	0.676	0.89
	N	48	48	47	48	46	32	38	39	37	34	26	29
Motivation T2	Correlation Coefficient	0.259	0.132	.452**	0.12	1	0.059	0.304	0.177	.439**	-0.059	0.271	-0.138
	Sig. (2-tailed)	0.078	0.375	0.001	0.428	.	0.746	0.072	0.293	0.008	0.745	0.19	0.483
	N	47	47	47	46	47	33	36	37	35	33	25	28
Checklist capability T2	Correlation Coefficient	0.197	.402*	0.18	-0.052	0.059	1	0.315	-0.187	-0.213	0.289	0.188	.537*
	Sig. (2-tailed)	0.273	0.021	0.315	0.775	0.746	.	0.125	0.37	0.308	0.161	0.44	0.022
	N	33	33	33	32	33	33	25	25	25	25	19	18
Overall capability T3	Correlation Coefficient	.390*	.391*	.592**	0.051	0.304	0.315	1	0.015	0.228	-0.191	0.178	.431*
	Sig. (2-tailed)	0.016	0.015	0	0.76	0.072	0.125	.	0.928	0.175	0.32	0.385	0.02
	N	38	38	37	38	36	25	38	38	37	29	26	29
Opportunity T3	Correlation Coefficient	0.144	-0.025	0.112	.613**	0.177	-0.187	0.015	1	-0.217	-0.01	-0.202	-0.125
	Sig. (2-tailed)	0.382	0.879	0.504	0	0.293	0.37	0.928	.	0.196	0.957	0.322	0.518
	N	39	39	38	39	37	25	38	39	37	29	26	29
Motivation T3	Correlation Coefficient	0.03	0.08	0.317	0	.439**	-0.213	0.228	-0.217	1	0.031	0.087	0.136
	Sig. (2-tailed)	0.861	0.636	0.06	0.999	0.008	0.308	0.175	0.196	.	0.873	0.679	0.491
	N	37	37	36	37	35	25	37	37	37	29	25	28
Behavioural intention T2	Correlation Coefficient	0.168	0.073	0.283	-0.198	-0.059	0.289	-0.191	-0.01	0.031	1	-0.15	0.241
	Sig. (2-tailed)	0.335	0.678	0.105	0.263	0.745	0.161	0.32	0.957	0.873	.	0.515	0.279
	N	35	35	34	34	33	25	29	29	29	35	21	22
Behaviour T3	Correlation Coefficient	0.184	-0.008	0.218	0.086	0.271	0.188	0.178	-0.202	0.087	-0.15	1	0.076
	Sig. (2-tailed)	0.369	0.971	0.294	0.676	0.19	0.44	0.385	0.322	0.679	0.515	.	0.744
	N	26	26	25	26	25	19	26	26	25	21	26	21
Checklist capability T3	Correlation Coefficient	0.098	0.228	0.277	0.027	-0.138	.537*	.431*	-0.125	0.136	0.241	0.076	1
	Sig. (2-tailed)	0.613	0.234	0.146	0.89	0.483	0.022	0.02	0.518	0.491	0.279	0.744	.
	N	29	29	29	29	28	18	29	29	28	22	21	29

* $p < .05$, ** $p < .01$.

3.6 Behavioural intention and behaviour

There was a very high degree of behavioural intention (see Figure 2) with the median percentage of patients with whom participants intended to use the knowledge and skills from the course with being 100%. There was a very high degree

of reported behavior (median of 100%) but this was significantly lower than behavioural intention (Wilcoxon Rank Sum = -2.02, $p < .05$). We only had pairwise data from 20 participants. Of these, eight people did less than they intended, 1 person did more and 11 did the same.

Table 5. Wilcoxon Rank Sum comparing capability, opportunity and motivation

	Overall capability time 3 –overall capability time 2	Opportunity time 3 –opportunity time 2	Motivation time 3 –motivation time 2	Checklist capability time 3 –checklist capability time 2	Knowledge capability time 2 –knowledge capability time 1
Z	-.536 [†]	-.943 [‡]	-.229 [‡]	-1.094 [‡]	-5.758 [‡]
Asymp. Sig. (2-tailed)	.592	.346	.819	.274	.000

[†] Based on positive ranks; [‡] Based on negative ranks.

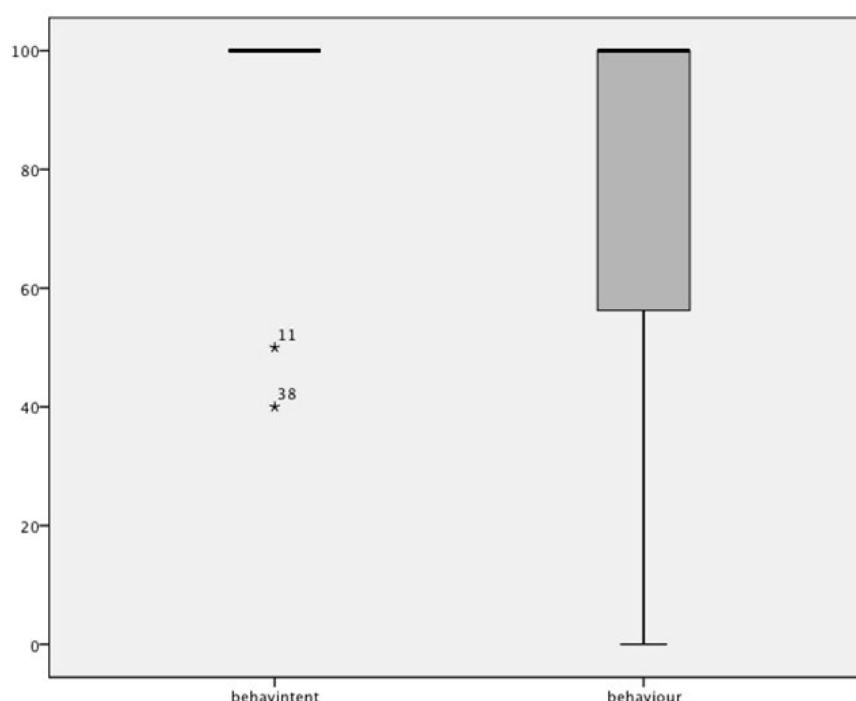


Figure 2. Boxplot of behaviour and behavioural intention scores (%)

3.7 Thematic analysis of perceptions

Three principal themes emerged from focus groups:

- (1) Systematic approach changing clinical practice
- (2) Inter-professional communication
- (3) Barriers and facilitators to implementation.

Each of these is discussed in more detail below, with illustrative quotes. The number of the focus group is denoted in brackets e.g., [FG 2] is focus group 2.

3.7.1 Systematic approach changing clinical practice

Health professionals already knew about an ABC approach but applying it systematically, and with the addition of ‘DE’ was different to their usual practice. “it’s theoretically in my

brain it is but in practice at times I find that you don’t follow it just like it is A-B-C-D-E”, “you jump some step, maybe you start from B, you don’t really concentrate on the area. . .” [FG 2]

The participants saw this as beneficial because a) it made them more likely to remember all steps, b) it was more efficient in terms of time.

a) Making them more likely to remember all the steps “Now the skill and the beauty with it, is that it organises your mind and. . . you’re not the same person again. You’re smart when you approach a case and you command yourself with self-reliance. You focus and you know how you’re handling a case scenario. You’re unlikely to miss out a case that needed. . . so

you'll achieve in management of your... patient", "the rest we do not really consider and yet they cost the life of our patients". [FG 6]

b) it was more efficient in terms of time "when you're systematic and orderly to tend to do things the right way... at the shortest and convenient time... more efficient". [FG 5]

3.7.2 Inter-professional communication

The benefits of inter-professional education were clear to focus group participants, particularly in terms of shared use of language to discuss patients and the mutual respect between professional groups.

"I feel so good because at least we are sharing ideas, we have known that we really have to communicate in that way so that we carry the-make the better management of patients". [FG 9]

Doctors commented that they felt the nurses might understand less theory but *"through the practical session everybody realises the doctor is not so good in the practice, so I find that it equalises". [FG 6]*

The development of a shared approach seemed important as participants commented that doctors and nurses had different approaches to patients: doctors starting with a history and examination whilst nurses tending to do short history and some vital signs. Doctors and nurses reported have a different language to discuss patients *"the nurses, the medical doctors, they all train in the basic knowledge but the information are not packaged, that someone else can also learn from it". [FG 6]*

The ABCDE approach is standard across the professions and this was valued by participants with doctors particularly valuing the potential for nurses taking an ABCDE approach. Previously, they partly knew the approach but didn't put it into practice—leave it to the doctors—or they would start on assessment, but not feel confident about management.

"You've been working the whole day. You're trying to catch a nap. [the midwife] tells you the patient has changed condition. You're like, seriously? That's all you can give me? Then she's like, doctor, come, hurry up, the patient has changed condition. Then you tell her, okay, check the vitals. I mean, if they have attended this course, clearly they know that when they're reporting, they'll tell you all those things. But prior to this, I don't think they're equipped to do that and I just wish all of them could be here. It's equipping. I like it." [FG 6]

Nurses also valued being taught together and also recognised

the importance of the shared language, reporting that in being more able to report to doctors in a useful way they would feel more empowered in their professional practice *"it has now taught us how to report to our doctors. Because now, the doctor, when he's coming, he knows what the next step as he's walking, coming to help." [FG 5]*

3.7.3 Barriers and facilitators to implementation

Knowledge/skills drop off: A potential barrier to implementation was skills drop off. Participants indicated that they would benefit from training over a longer time and more mnemonics to help remember parts of the approach. Participants suggested that they would benefit from some reinforcement of their learning beyond the single day of the course.

Participants commented that the combination of theory and skills, using dummies and scenarios, are good for learning as *"it's what I've experienced. It stops being in a book... it's real" [FG 6]*

A facilitator to implementation could be that training becomes part of routine practice, including training participants in how to teach others (so-called "train the trainers") *"But what we need is the knowledge and then how to transfer the knowledge to others so that I don't remain the king of the knowledge" [FG 6]*

Resources: Participants cited a difficulty in following elements of the approach, in particular calling for help, as there was often nobody else to help. They also discussed whether lack of equipment was a barrier to implementation. Some felt that it was, as it meant that measuring key indicators was not possible. Some felt that it was not a barrier as the majority of the approach called for a "look, listen feel" approach to assessment and that this didn't require equipment. Students felt that shortage of equipment might be a barrier in practicing the skills following the course.

Confidence and motivation: Participants reported feeling more confident, and that this confidence came from understanding the reasons they were doing something *"it's just like we have gained more confidence to put them into practice. So we may just put them more into practice and into context" [FG 1]*

Interestingly, one participant indicated that the course being delivered by UK staff was beneficial in terms of their motivation, saying *"I can do basically the same things that are being done in the developed world in a resource limited setting. Yes, it's really encouraging to me... and having this feeling that I can actually do the same thing given our resources it's fantastic" [FG 2]*

4. DISCUSSION

We aimed to measure capability, opportunity and motivation and we found that participants were willing and able to answer questions about behaviour change concepts. We aimed to examine whether capability, opportunity and motivation changed over the period of a month after education. We found that there was little change in these constructs in this time period. We aimed to investigate whether any of capability, opportunity and motivation were associated with behavioural intention or behaviour and we found that they were not.

We explored barriers and facilitators to implementation and found that participants reported that the systematic approach to acute illness management would be useful, that the multidisciplinary nature of the training was good. Increasing interprofessional learning and practice has been a target for HIC healthcare professionals for many years but has proved difficult, in some part due to the cultures and silos of learning within professions.^[24] Our participants were not used to learning with other professions and appeared to welcome the opportunity to do so, evidenced by their comments about having a shared language and understanding of what information was needed for working together in the shared assessment/management of a patient. They suggested that there could be better outcomes for patients as a result of a more joined up approach.

There were some specific facilitators and barriers to implementation of the new skills into practice. These included a lack of opportunity to ask for senior support when they needed it. They discussed equipment and some felt this was a barrier in their routine clinical care whilst others did not. Understanding the barriers from a local perspective is fundamental to tailoring the education in a way that optimises the chances of implementation. Indeed, the educators involved in this study, with their clinical colleagues, have piloted a version of AIM[©]/M-AIM[©] tailored for a low-resource settings. Importantly, having HIC tutors was not seen as a barrier. It would appear that having different HIC experience made the tutors seem more expert.^[25] Psychological research has shown that experts are often more persuasive in terms of behaviour change than non-experts.^[26]

Confidence was mentioned by participants. The importance of confidence in changing behaviour is well known.^[27] The M-AIM[©] sessions did not explicitly target confidence, but seems to have increased it nevertheless. There is ample evidence that confidence, or self-efficacy, is increased by persuasive messages and mastery experiences.^[28] The M-AIM[©] courses are likely to have been increased in their efficacy by a) persuasive messages that participants can im-

plement this programme effectively and b) increasing the sense of “mastery” by giving hands-on experience of successfully using what they are learning. Understanding the effective components of a complex educational intervention will allow future courses to focus more on those effective elements.

Limitations

Summation of questions into the concepts of capability, opportunity and motivation showed a range of internal consistencies, some of which were low. Consistency was not much improved by deleting some items.

Measurement was hindered by difficulties the participants seemed to have in understanding the questions about behaviour and behavioural intention. We also found a lack of variation in the measures of behavioural intention and behaviour *i.e.*, they were very high at both time points. Participants also reported very high levels of motivation and capability. The self-reported high levels of capability were not born out by the measures of knowledge capability as the self-report and tested knowledge measures did not correlate. Mean knowledge capability at time 2 (post-course) was, in fact, lower than the pass mark for this course in the UK. We found that levels of capability, opportunity and motivation were stable over time in that these measures correlated with themselves at time 2 and time 3 and there were no significant changes in median scores (Wilcoxon Rank Sum).

None of capability, opportunity or motivation were found to predict either behaviour or behavioural intention. There are a number of possible reasons for this. Firstly, they might not be predictors in this context but so little behaviour change work has been conducted on staff in low-income countries, this is speculative. The social cognition models of behaviour rely on the individual making deliberate decisions.^[12] In resource-limited settings, it could be that healthcare professionals may be able to make less deliberate decisions around their clinical practice, with clinical practice being much more influenced by opportunity of time and resource. The fact that behaviour change and implementation research is most often conducted in resource-rich, high-income environments may, therefore, reduce the applicability of some behaviour change theories to this context. It is important that future studies seek to empirically test behaviour change theories in low-income country settings. Secondly, there was limited variability in behavioural intention and in behaviour thus reducing the possibility of finding statistically significant relationships between the determinants and the dependent variables. Thirdly, it is possible that although many of the individual items were from established measures, the concepts of capability, opportunity and motivation combine too many theoretical domains

of behaviour change to be used as determinants of behaviour change in this context. Indeed, it is likely that the COM-B model was not intended for use in this way, but rather as an overarching explanatory framework. We have found that using the COM-B with educator colleagues has allowed us to introduce and discuss determinants of behaviour change.

We suggest, therefore, that future research should address the following key challenges. Firstly, create, pilot and deploy a measure of behavioural intention and a measure of behaviour that is easily understood by international health-care professionals and that is sensitive to differences between people. Secondly, use COM-B to explain behavioural determinants to educators and health professionals but assess more granular determinants of behaviour change. Conducting implementation research in a LMIC is challenging for a number of reasons. Unless the researchers are permanently in situ in the LMIC, the research must be organised largely at a distance. This is problematic in terms of practicalities of distributing questionnaires, collecting responses and recruiting participants. Ethics Committees in different countries have different requirements and it is difficult, at a distance, to respond in a timely and appropriate fashion to their queries. We found that there were cultural and language challenges that made the completion of questionnaires more difficult and therefore more time consuming, although our participants were willing to participate in all aspects of our research.

5. CONCLUSIONS

We found that education can be evaluated by its impact on determinants of practice change but that our measures required refinement to understand the relationships between behavioural determinants and behaviour. Understanding the determinants of change in health professionals' practice gives a target for quality improvement of education. Improving the impact of education on practice is crucial to improving

health outcomes, particularly in resource-limited contexts.

Highlights

- (1) Participants had clear ideas about the usefulness of acute illness management training and what might impede implementation into practice.
- (2) Participants valued interdisciplinary training and could see how this would improve management of acutely ill patients.
- (3) Lack of senior support and, for some participants, lack of equipment were barriers to using acute illness management training in their clinical practice.
- (4) Training courses delivered by UK staff in low-income countries would benefit from a focus on how the knowledge and skills could be implemented in practice and what local barriers might exist.

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CONFLICTS OF INTEREST DISCLOSURE

The authors declare no financial or commercial competing interests. LBD, JH, AA, HS, GY, JT, CA, MJo declare no other competing interests. MJa is on the AIM[©] advisory Board, RM is on the M-AIM[©] Advisory Board, AS is Director of the Greater Manchester Critical Care Skills Institute, GB was, at the time of the study being conducted, the Director of UHSM Academy.

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